

Gradiometer Instructions

General:

Bring a screwdriver for the brass bolts. (There should always be a quarter in the case if you forget to bring a screwdriver.)

When possible, connect the console to a charger overnight.

The VLF unit is not located in the case, and it is only compatible with the gradiometer.

When used far away from the previous location, it is best to connect the GPS antenna first to allow the console to determine the new location, which may take 30 minutes. The GPS receiver does not work inside, or through glass. Open outdoor space is best.

Be mindful of where the cable connections are while assembling the unit so they are not being dragged through dirt and sand.

Backpack:

For backpack mount, use the two brass screws (note their location in the case so you know where to put them back later!) to attach the angled element (club-shaped) to the backpack, making sure that both screws pass through the holes in the frame, from the inside out (front to back). The club-shaped end should be pointing up and out.

There are seven extension bars in the case, six of them are longer and one is shorter. The shorter extension bar is located the same place as the angled element just attached, and five longer extension bars are located inside the lid of the case.

Bolt the shorter extension bar on top of the angled element, add one white magnetometer sensor, add another one longer extension bar (it may not fit all flush all the way) and attach the other white magnetometer. The two magnetometer sensors are exactly the same, so their order does not matter. Then, add another longer extension bar and the small white GPS antenna on top using its black bolt.

Remove the black plastic cover from the GPS antenna connector, and connect the GPS antenna cable using the threaded end (rather than the twist-on end) to the antenna (this is the end closer to the velcro strap and marked with "amphenol"). Put the cover into the bubble wrap bag and into the case, so it won't be lost.

If working with the VLF unit, make sure the cord connection side is faced down. Then, connect the white plastic end to the backpack. There are two small pairs of white plastic boards located at the bottom of the backpack, each of them with two screw and nuts. Put the VLF unit in between each pair as horizontal as possible.

When handling the assembled backpack, it is best to carry it by one of the two extension elements, because the backpack itself is very heavy and poorly balanced. For the same reason, when mounting the backpack (after first mounting the console) have another person help with lifting it until it is securely in place.

Console and harness:

The console is to be carried in front of your body, attached to a harness, with the pads on your shoulders. With the display facing upward, and the text on the console facing so you can read it, attach the short straps from the shoulder pads to the top connectors, and one of the bottom connectors the corresponding longer strap. Then lift the straps over your head, so that your head is between the short straps, the cross-over patch on your back and your arm through the loop that is closed. Connect the remaining strap so that the console is now suspended in front of you.

Cables:

Connect the twist-on end of the black GPS antenna cable to the port on the right of the console, labeled "GPS". There are two connectors for magnetometer sensor on the console, with "upper" and "lower" labeled separately. There will be also one connector for the VLF unit. Connect all of the sensors to the proper port. BE CAREFUL TO CHECK BEFORE YOU TRY TO CONNECT THEM TO AVOID DAMAGE TO THE EQUIPMENT!

Operating the console:

Power on: press "B". Then, the main screen will display.

A – survey		B – diurn.cor	F – GPS
			yes
C – info	OF – off	D – test	
			15 11 2000
E – time-synch		1 – send	TU
			00:00:52
45 – erase		2 – enter-text	
			12.3V

In order to run a survey, it is necessary to first set up the GPS and achieve a lock on several satellites.

GPS:

On the main screen type "F" to get into the satellite menu. If satellite is already activated ("GPS yes"), type "F" again to go the next menu, (otherwise "C" to change the status to "yes" and then "F" again for the next (main GPS) menu).

A – initialize	B – navigation	
C – synch-to-UTC	D – datum	E – test
	1 – L1-satellite-info	
8 – UTC+13 9+		
		F

If this is your first survey, type "A" to initialize, then "A" for automatic, which should return you to the main GPS menu. Now type "E" for test. Initially this will probably give you a string with random characters under "waiting for GPS", but after a while (up to 30 minutes if you start in a new location far, > 500 miles, from the previous one), the display will show meaningful data including the present location at the bottom (i.e. 034.0575610, -117.8249892).

This means there are enough satellites locked, and the unit is ready for a survey (but do check that the location at the bottom makes sense). Go back to the main menu by pressing "1" and "C" simultaneously (you can always return to the main menu this way).

Survey setup:

In the main menu, type “A” to enter the survey menu. This is where you can change the settings for the survey but for now we’ll keep most of them as default values.

Survey mode	Position	Time	File	Cycling
Tuning AC filter	Display	Mode	Text	ID
connect sensors now			sensors	
Walk grad +vlf	1.0s			
A-start	3638717 readings	C-Change		BF

However, we do need to adjust our survey mode. Highlight “survey mode” then press “C”, you will see the following display and choose accordingly (from options 1-4 only!) based on your survey. (Our suggestion will be “4 – walkgrad + vlf”.)

A – mobile	B – base	C – grad
D – vlf	E – mobile+vlf	F – grad+vlf
1 – walkmag	2 – walkgrad	
3 – walkmag+vlf	4 – walkgrad+vlf	

If you choose “vlf” as part of your survey, you need to choose your VLF stations. Our current suggestion is to use 3 vlf stations: 24.0, 24.8, 25.2. However, this may depend on your location, and you can test which stations have a strong signal at your site. (This will be explained in the next section.)

of VLF stations?
24.0 24.8 25.2
F – ok C – change-number

You can also set your own file name under the survey menu. Highlight “File” then press “C”, then enter your file name in the blank area. (You can only enter 6 characters as part of your file name. Otherwise, your file name will be numbered as default.) The first 2 digits will increase by one with each file change. Adding a unique identifier after the numbers (your initials or name if it’s short) will be helpful in case you forget which file is yours. The file extension is dependent on which survey mode is selected. Since we chose walking grad + vlf, it gives the file a .wgv extension. Base stations will be .b, vlf will be .v, walking grad will be .wg, etc.

06t	.wgv
E – enter	DF

Survey:

Press “A” to start your survey. Some message will flash by, then you will see a display starts with “F – start-survey”, with an arrow on the right and Lat/Long info at the bottom. Press “F” to start, then the unit will tell you to wait. Finally, a window giving you the option between “A” – stop - and “C” – walk - will appear. Choose “C” when you are ready to start the survey. Now, the instrument will start recording magnetic field measurements every two seconds.

In order to take a VLF reading, you need to stop and press “F”. (You may need to hold the button a little longer.) Then the screen will display your first VLF station and some arrows. You need to adjust your body according to those arrows in order to make the VLF device horizontal. Once aligned properly, the device will take the VLF measurements for each station.

To test which VLF station has the best signal, we can only start the test after we start our actual survey. Press “A” for menu, then choose “3-vlf”, and then “C-scan”. The device will start with measurement of our current stations. Then it will automatically test all 20 stations. (This may take a while, and you have to keep the VLF device horizontal for the entire time.) By the end of the test, it will display all the results, and you can choose the stations with the highest pT value. (Ideally, we want a pT value higher than 5. However, it is very hard to have those. Above 0.5 pT is acceptable, but we still prefer to choose those stations higher than 2 pT)

When done, type “A” and hold until the screen goes blank. To completely turn off the unit, type “1C” followed by “0F”.

Transfer to PC:

Connect console to PC using the serial (RS232) cable to the RS232/PWR port on the console and serial port on the PC. Don’t use the USB connector as it hasn’t been set up for the tough book. Open GemLink on laptop PC. Turn on console, from main menu choose “1” – Send – and the console will ask for the number of the file *(At this point text should appear in the GemLink window on the laptop. If no text appears, check all connections and consult Dr. Polet prior to continuing)*.

Type “C” to change the number, “F” for “OK” to continue with last requested file number/last saved file. If “C” is selected to select a different file number, enter new file number and select “E” for “enter” to return to previous file number selection screen. After selecting “F” for “OK” to confirm the requested file number, select “D” for “Default” *(At this point, files are being transferred from the console to the PC. Do not disconnect, adjust the cables, or turn off the console or laptop. You should see a string of text appearing on GemLink, text will vary depending on initial survey settings. If no text appears, check all connections and consult Dr. Polet prior to continuing)*. You can only transfer one survey at a time. If you want to keep each of your surveys as their own individual text files, you’ll have to download the survey to GemLink, save the file, close and reopen GemLink and do it again.

Note: The files are sequentially numbered, you can see a directory of files from the main menu: type “C” – info and then “D” – dir - . This will show you a list of files and you can find the most recent one.

Turning off the Console:

When all files are successfully transferred to the PC, go to the main menu by pressing "C" and "1" simultaneously, then press "0" and "F" to turn off the console.